

Please check that this question paper contains 33. Questions and has 7 Printed pages.

Roll No. _____

D.A.V. INSTITUTIONS, CHHATTISGARH**SAMPLE QUESTION PAPER -2023-24****CLASS –XII****SUBJECT: CHEMISTRY****Time Allowed: 3 Hours****Maximum Marks: 70****Instructions :**

1. There are 33 Questions in this Question paper. All questions are compulsory.
2. Section A: Question no. 1 to 16 are MCQs and Assertion-Reason type questions carrying 1 mark each.
3. Section B: Question no. 17 to 21 are short answer type I questions and carry 2 marks each.
4. Section C: Question no. 22 to 28 are short answer type II questions and carry 3 marks each.
5. Section D: Question no. 29 & 30 are case based questions and carry 4 marks each
6. Section E: Question no. 31 to 33 are long answer type questions and carry 5 marks each.
7. There is no overall choice. However, an internal choice has been provided.
8. Use of calculators and log tables is not permitted.

SECTION – A

The following questions are multiple choice questions with one correct answer. There is no internal choice in this section.

1. When the initial concentration of reactant is doubled in a reaction, the half life period is not affected.
The order of reaction is :
 - (a) Second
 - (b) Zero
 - (c) First
 - (d) More than zero but less than the first.
2. Which of the following will not give test for Cl^- ion with AgNO_3 (aq) at 25°C :
 - (a) $\text{CoCl}_3.5\text{NH}_3$
 - (b) $\text{CoCl}_3.6\text{NH}_3$
 - (c) $\text{CoCl}_3.3\text{NH}_3$
 - (d) $\text{CoCl}_3.4\text{NH}_3$

3. The reagent which do not react with acetone and benzaldehyde :
- Sodium hydrogen sulphite
 - Phenyl hydrazine
 - Fehling solution
 - Grignard reagent
4. 2-Methoxy propane on heating with HI produce :
- Methyl alcohol and sec- propyl iodide
 - Methyl iodide and tertiary butyl alcohol
 - Methyl iodide and propan-2-ol
 - Methyl alcohol and tertiary butyl iodide
5. Positive carbylamines test is shown by :
- N,N-dimethyl aniline
 - Tri methyl amine
 - N- methyl aniline
 - p- Methyl benzyl amine
6. If the E^0 cell for a given reaction has a positive value, this means that :
- ΔG^0 is positive, K is greater than 1
 - ΔG^0 is positive, K is less than 1
 - ΔG^0 is negative, K is greater than 1
 - ΔG^0 is negative, K is less than 1
7. Rate law for the reaction :
- $A + 2 B \longrightarrow C$ is found to be $\text{Rate} = k [A] [B]$. Concentration of reactant "B" is doubled keeping the concentration of "A" constant, the value of the rate constant will be ——
- The same
 - Doubled
 - Quadrupled
 - Halved
8. The order of basic character of amines in aqueous solution is :
- $(\text{CH}_3)_3\text{N} > (\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > \text{NH}_3$
 - $\text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N} > \text{NH}_3$
 - $\text{NH}_3 > (\text{CH}_3)_3\text{N} > (\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2$
 - $(\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > (\text{CH}_3)_3\text{N} > \text{NH}_3$
9. Products of electrolysis of an aqueous solution of AgNO_3 using silver electrode will be :
- (Given $E^0_{\text{Ag}^+/\text{Ag}} = 0.80 \text{ V}$)
- Ag at cathode, O_2 at anode.
 - H_2 at cathode, O_2 at anode.
 - Ag at cathode, dissolution of Ag from anode.

(d) H₂ at cathode, Ag at anode

10. Interstitial compounds are formed when small atoms are trapped inside the crystal lattice of metals.

Which of the following is not the characteristics property of interstitial compound ?

(a) They have high melting point in compare to pure metals

(b) They are very hard.

(c) They retain metallic conductivity.

(d) They are chemically very reactive.

11. The compound which is most acidic among the following is :

(a) Phenol

(b) p- Nitro phenol

(c) o – Nitro phenol

(d) m – Nitro phenol

12. Which of the following molecule is chiral in nature.

(a) 2 – Bromo butane

(b) 1- Bromo butane

(c) 2- Bromo propane

(d) 2- Bromopropan- 2- ol

In the following (Qno.12-16) a statement of assertion followed by a statement of reason is given.

Choose the correct answer of the following choices.

(a) Assertion and reason both are correct but reason is correct explanation for assertion.

(b) Assertion and reason both are correct but reason is not correct explanation for assertion

(c) Assertion is correct statement but reason is wrong.

(d) Assertion is wrong statement but reason is correct statement

13. **Assertion-**K₂Cr₂O₇ crystals are orange in colour whereas KMnO₄ crystals are deep purple in colour

Reason - Colour of the compound is due to d-d transition in the transition metal ions present in them

14. **Assertion-** Aniline cannot be prepared by Gabriel phthalimide reaction

Reason - Aryl halide do not undergo nucleophilic substitution reaction under laboratory conditions

15. **Assertion-** Toxic metal ions are removed by the cheating ligands.

Reason- Chelate complexes tend to be more stable.

16. **Assertion-**Bond angle in ether is slightly less than than 109°28'.

Reason- There is a repulsion between the two alkyl (-R) groups .

SECTION – B

This section contains five questions with internal choice in one question.

17. State reason for each of the following:

- (a) Using IUPAC norms, write the formula of Hexaammine cobalt (III) sulphate
- (b) On the basis of crystal field theory, write the electronic configuration of d^4 ion if $\Delta_o < P$

18. Give reason :

- (a) Write structure of 4-tert-Butyl-3-iodo-heptane.
- (b) Although Chlorine is an electron withdrawing group, yet it is ortho – para directing in electrophilic aromatic substitution.

OR

- (a) Write the structure of 1-Bromo-4 – sec-butyl – 2- methyl benzene
- (b) How will you convert Chlorobenzene to Biphenyl.

19. Arrange the following compounds in increasing order of their property as indicated.

- (a) CH_3CHO , $\text{C}_6\text{H}_5\text{CHO}$, HCHO (reactivity towards nucleophilic addition reaction)
- (b) 4- dinitrobenzoic acid, 4- methoxybenzoic acid, 4-nitrobenzoic acid (acidic character)

20. What type of a battery is lead storage battery ? Write the anode and cathode reaction and the overall reaction occurring in the operation of lead storage battery.(only reaction)

21. What do you understand by rate law and rate constant of a reaction. Identify the order of reaction if the units of rate constant are –

- (a) $\text{L}^{-1}\text{mol s}^{-1}$
- (b) $\text{L mol}^{-1} \text{s}^{-1}$

SECTION C

This section contains seven questions with internal choice in one question

22. Calculate the boiling point elevation for a solution prepared by adding 10 g of CaCl_2 to 200 g of water.(K_b for water= $0.512 \text{ K kg mol}^{-1}$, molar mass of CaCl_2 = 111 gmol^{-1})

23. Write I.U.P.A.C name of the following complexes :

- (a) $[\text{Ni}(\text{NH}_3)_6]\text{Cl}_2$
- (b) $\text{K}_3[\text{Cr}(\text{Ox})_3]$
- (c) $[\text{Co}(\text{en})_3]^{+3}$

OR

- (a) Write the formula of the co-ordination compound Iron(III)hexacyanidoferrate (II)
- (b) What type of isomerism is exhibited by the complex $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$?
- (c) Write the hybridisation and no. of unpaired electrons in the complex $[\text{CoF}_6]^{-3}$

24. Complete the following equations :

- (a) $C_6H_5N_2Cl + H_3PO_2 + H_2O \longrightarrow$
(b) $CH_3CONH_2 + Br_2 + NaOH \longrightarrow$
(c) $CH_3CH_2NH_2 + CHCl_3 + \text{alco. KOH} \longrightarrow$

25.

- (a) What is the structural difference between a nucleoside and a nucleotide.
(b) Name the type of bonding which stabilizes α helix in proteins.
(c) Why vitamin C cannot be stored in our body

26.

- (a) Draw the plot of $t_{1/2}$ vs. initial concentration $[A]_0$ for a first order reaction
(b) A first order reaction takes 40 min for 30% decomposition. Calculate $t_{1/2}$ for first order reaction
($\log 7 = 0.8451$, $\log 10 = 1$)

27.

- (a) Give the equation of reaction for the preparation of phenol from cumene.
(b) Write the mechanism of hydration of ethane to yield ethanol.

28.

- (a) What are ambident nucleophiles ? Explain with an example.
(b) Which compound in each of the following pairs will react faster in S_N2 reaction with $-OH^-$?
(i) CH_3Br or CH_3I
(ii) $(CH_3)_3CCl$ or CH_3Cl
(c) Why Grignard reagent should be prepared under anhydrous conditions ?

SECTION D

This section contains two case based questions. Each question has an internal choice.

29. Students are often fascinated by extreme sports such as SCUBA (Self –Contained Underwater Breathing Apparatus) diving. But scuba divers must be very conscious of Caisson's disease, commonly called the 'The Bends'. This condition is related more to Henry's Law, which states that more gas will be dissolved in a liquid when the gas is pressurized. Because of the water pressure, body tissue absorbs nitrogen gas faster as a diver descends than when ascending the surface. However if a diver ascends too quickly, nitrogen gas bubbles will form in body tissue rather than being exhaled. These nitrogen bubbles will form in body tissue cause severe pain.

- (a) Why are aquatic species more comfortable in cold water than in warm water ?
(b) Why scuba divers use air diluted with less soluble helium for breathing ?
(c) The solubility of CO_2 in water at 298K under 760mm Hg. (K_H for CO_2 in water at 298 K is 1.25×10^6 mm Hg)

OR

What concentration of N_2 should be present in a glass of water at room temperature? Assume a temperature of $25^\circ C$, a total pressure of 1 atmosphere and mole fraction of N_2 in air of 0.78. [K_H for nitrogen = 8.42×10^{-7} M/mm Hg.

30. D-Glucose, the most abundant carbohydrate and the most abundant organic compound (if all its combined forms are considered), belong to the class of carbohydrate called monosaccharaides . Monosaccharaides are carbohydrate molecules that cannot be broken down to simpler carbohydrates by hydrolysis, so they are sometimes referred to as simple sugars.. They can be joined together to form a larger structure, namely oligosaccharides and polysaccharides that can be converted into monosaccharaides by hydrolysis.

Glucose also called dextrose belongs to a group of carbohydrates called monosaccharaides. Glucose has the molecular formula $C_6H_{12}O_6$.It is found in fruits and honey and is the major free sugar circulating in the blood of higher animals. It is the source of energy in cell function, and the regulation of its metabolism is of great importance (glucogenesis). Molecules of starch, the major energy reserve carbohydrate of plants, consist of thousands of glucose units as do those of cellulose. Also composition of glucose is glycogen, the reserve carbohydrates in most vertebrate and invertebrate animal cells as well as those of numerous fungi and protozoans.

- (a) What is the basic structural difference between glucose and fructose
- (b) What are anomers?
- (c) What happens when D-glucose is treated with following reagents?
 - (i) HCN
 - (ii) Br_2 water

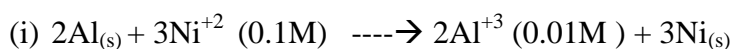
OR

- (i) Write the name of component of starch which is water soluble.
- (ii) What type of linkage is present in polysaccharide?

SECTION- E

This section contains long answer type questions. All questions have an internal choice.

31. Represent the cell in which the following reaction takes place.

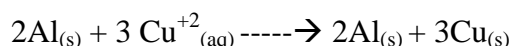


Calculate its EMF if $E^0_{cell} = 1.41V$

- (ii) How does molar conductivity vary with increase in concentration for strong and weak electrolyte? How can you obtain limiting molar conductivity (λ^0_m) for weak electrolyte.

Or

- (i) Write Nernst equation for the reaction at $25^{\circ}C$.



- (ii) State Kohlrausch law
- (iii) The conductivity 0.001 mol L^{-1} acetic acid is $4.95 \times 10^{-5} \text{ S cm}^{-1}$. Calculate the dissociation constant if λ^0_m acetic acid is $390.5 \text{ S cm}^2 \text{ mol}^{-1}$.

32.

- (a) Give IUPAC name of Salicylic acid.
- (b) Arrange the following compounds in the increasing order of acidic strength-
- (i) $\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{COOH}$
 - (ii) $\text{CH}_3\text{CH}(\text{Br})\text{CH}_2\text{COOH}$
 - (iii) $(\text{CH}_3)_2\text{CHCOOH}$
 - (iv) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$
- (c) Write the products formed when $(\text{CH}_3)_3\text{C-CHO}$ reacts with the following :-
- (i) Zinc amalgam and dilute HCl.
 - (ii) Concentrated Sodium Hydroxide solution
 - (iii) Semicarbazide

Or

- (a) Illustrate the following name reaction giving a suitable example of each.
- (i) Cannizzaro reaction
 - (ii) Rosenmund's reduction
- (b) A compound A [$\text{C}_2\text{H}_4\text{O}$] on oxidation gives B [$\text{C}_2\text{H}_4\text{O}_2$]. A undergoes Iodoform reaction. On treatment with HCN gives a product C which on Hydrolysis gives 2 hydroxypropanoic acid. Name the product when A react with dilute NaOH. Identify A, B, C, D and write chemical equations involved.

33. Attempt any five of the following:

- (a) Complete the equation : $\text{Fe}^{+2} + \text{MnO}_4^- + \text{H}^+ \longrightarrow$
- (b) Ti^{+4} is colourless whereas V^{+4} is coloured in aqueous solution. Explain.
- (c) Transition metals exhibits higher enthalpies of atomisation. Why?
- (d) Zr and Hf have almost identical radii. Explain.
- (e) What is Lanthanoid contraction? Write any one consequence.
- (f) Transition metals shows variable oxidation states. Why?
- (g) The enthalpies of atomization of the transition metals are high. Explain.